

Appl. No. 10/775,707

Amdt. dated January 10, 2005

Reply to Office action of December 9, 2004

Amendments to the Claims:

Please amend the claims as indicated.

Claims 1-11 (Canceled)

12. (Previously Presented) An apparatus to orientate a body with respect to a surface spaced-apart from said body, said apparatus comprising:

a flexure system having a range of motion associated therewith;

a body, coupled to said flexure system; and

a pre-calibration stage to position said body to be spaced-apart from said surface a distance with said distance being less than said range of motion.

13. (Original) The apparatus as recited in claim 12 wherein said pre-calibration stage further includes an actuation system to position said body to have a predetermined spatial relationship with said surface.

14. (Original) The apparatus as recited in claim 13 wherein said predetermined spatial relationship includes positioning said body to be substantially parallel to a sub-portion of said surface in superimposition therewith.

15. (Currently Amended) The apparatus as recited in claim 12 wherein said flexure system includes a first flexure member defining a first axis and a second flexure member defining a second axis with said pre-calibration stage further including an actuation system, a flexure ring, and a base plate with said first and second flexure

Appl. No. 10/775,707

Amdt. dated January 10, 2005

Reply to Office action of December 9, 2004

members being connected to said flexure ring and said flexure ~~system~~ ring being connected to said base plate, said body being connected to said flexure system to rotate about said first and second axes in response to movement caused by said actuation system with said first axis extending orthogonally to said second axis.

16. (Original) The apparatus as recited in claim 15 further including a force sensor connected between said base plate and said flexure ring.

17. (Original) The apparatus as recited in claim 13 wherein said flexure system includes a first flexure member defining a first axis and a second flexure member defining a second axis with said body being coupled to said flexure system to rotate with respect to said first and second axes in response to movement caused by said actuation system to position said body in a desired orientation with respect to said surface and to maintain said orientation in response to a force being exerted upon said body.

18. (Original) The apparatus as recited in claim 13 wherein said predetermined spatial relationship includes a separation between said body and said surface, defining a gap therebetween, and further including having a gap sensing device to produce information corresponding to said gap with said actuation system coupled to receive said information and to position said body in response to said information to maintain said predetermined spatial relationship.

Appl. No. 10/775,707

Amdt. dated January 10, 2005

Reply to Office action of December 9, 2004

19. (Original) The apparatus as recited in claim 12 wherein said first and second flexure members each includes a mount, a pair of spaced-apart braces, a first flexure arm pivotally connected between said mount and one of said pair of spaced-apart braces, and a second flexure arm pivotally connected between said mount and one of said pair of spaced-apart braces disposed opposite to said first flexure arm with said pair of spaced-apart braces being attached to said flexure ring.

20. (Original) The apparatus as recited in claim 12 wherein said first and second flexure members are coupled together to provide said flexure system with eight joints with said joints being spaced-apart from a pivot point defined by the intersection of said first axis and said second axis.

Claims 21-27 (Canceled)

28. (Previously Presented) An apparatus to orientate a body with respect to a surface spaced-apart from said body, said apparatus comprising:

a flexure system having a range of motion associated therewith, said flexure system including a first flexure member with first and second arms each of which includes a first set of flexure joints and a second flexure member having third and fourth arms each which includes a second set of flexure joints;

a body, coupled to said flexure system, with said first set of flexure joints providing provide pivotal motion of said body about a first orientation axis and said

Appl. No. 10/775,707

Amdt. dated January 10, 2005

Reply to Office action of December 9, 2004

second set of flexure joints providing pivotal motion of said body a second orientation axis; and

a pre-calibration stage to position said body to be spaced-apart from said surface a distance with said distance being less than said range of motion.

29. (Previously Presented) The apparatus as recited in claim 28 wherein said first set of flexure joints are parallel to each other, and said second set of flexure joints are parallel to each other.

30. (Previously Presented) The apparatus as recited in claim 28 wherein said first and second sets of flexure joints are constructed of a flexible material.

31. (Previously Presented) The apparatus as recited in claim 28 wherein each of said first, second, third and fourth arms comprise a first notch attached to a corresponding said flexure member; a second notch for attachment to a fixed object; and a rigid body section extending between said first and second notches.

32. (Previously Presented) The apparatus as recited in claim 28 further comprising actuators in operable contact with said flexure member to cause said body to pivot about said pivot point.

33. (Previously Presented) The apparatus as recited in claim 32 wherein said actuators are piezo actuators.

Appl. No. 10/775,707

Amdt. dated January 10, 2005

Reply to Office action of December 9, 2004

34. (Currently Amended) The apparatus as recited in claim 33 wherein said piezo actuators are capable of being shortened and lengthened, causing said body to rotate about ~~end~~ of said first and second orientation axes.

35. (Currently Amended) An apparatus to orientate a body with respect to a surface spaced-apart from said body, said apparatus comprising:

a flexure system;

a flexure ring;

a base plate;

a force sensor connected between said flexure ring and said base plate, with said flexure ring being coupled to said flexure system;

a body; and

a pre-calibration stage coupled to said flexure system with said body being coupled to said flexure system to move in response to movement caused by said pre-calibration system.

36. (Previously Presented) The apparatus as recited in claim 35 wherein said pre-calibration stage positions said body to extend parallel to a sub-portion of said surface in superimposition therewith.

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Appl. No. 10/775,707

Amdt. dated January 10, 2005

Reply to Office action of December 9, 2004

37. (Previously Presented) The apparatus as recited in claim 35 wherein said flexure system includes a first flexure member defining a first axis and a second flexure member defining a second axis with said body being coupled to rotate about said first and second axes in response to movement caused by said actuation system to position said body in a desired orientation with respect to said surface and to maintain said orientation in response to a force being exerted upon said body.

38. (Currently Amended) The apparatus as recited in claim 35 ~~further including a flexure ring, a base plate and a force sensor connected between said flexure ring and said base plate with~~ wherein said flexure system further ~~including~~ includes a first flexure member defining a first axis and a second flexure member defining a second axis with said first and second flexure members being connected to said flexure ring.

39. (Previously Presented) The apparatus as recited in claim 35 wherein said flexure system further includes a first flexure member defining a first axis and a second flexure member defining a second axis with said first and second flexure members being coupled together to provide said flexure system with eight joints with said joints being spaced-apart from a pivot point defined by the intersection of said first axis and said second axis.

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Appl. No. 10/775,707

Amdt. dated January 10, 2005

Reply to Office action of December 9, 2004

40. (Previously Presented) The apparatus as recited in claim 35 wherein said flexure system includes a first flexure member defining a first axis and a second flexure member defining a second axis, said body being coupled to said first and second flexure members to facilitate movement of said body with respect to said first and second axes so that movement of said body with respect to said first axis is decoupled from movement of said body with respect to said second axis.

41. (Previously Presented) The apparatus as recited in claim 40 wherein said first axis extends orthogonally to said second axis.

42. (Previously Presented) The apparatus as recited in claim 35 wherein said flexure system includes a first flexure member defining a first axis and a second flexure member defining a second axis with said body being coupled to rotate about said first and second axes in response to movement caused by said actuation system to position said body in a desired orientation with respect to said surface.

43. (Previously Presented) The apparatus as recited in claim 42 wherein said desired orientation includes a separation of said body from said surface, defining a gap therebetween and further including having a gap sensing device to produce information corresponding to said gap with said actuation system coupled to receive said information and to position said body in response to said information.

Appl. No. 10/775,707

Amdt. dated January 10, 2005

Reply to Office action of December 9, 2004

44. (Previously Presented) The apparatus as recited in claim 42 further including a housing with said flexure system further including a first flexure member defining a first axis and a second flexure member defining a second axis with said actuation system being coupled between said first and second flexure members and said housing.

45. (Previously Presented) The apparatus as recited in claim 44 wherein said first and second flexure members each includes a mount, a pair of spaced-apart braces, a first flexure arm pivotally connected between said mount and one of said pair of spaced-apart braces, and a second flexure arm pivotally connected between said mount and one of said pair of spaced-apart braces disposed opposite to said first flexure arm.

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